

Predictability of Stock Returns based on the Partial Least Squares Methodology

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Abstract [*a very detailed version*]

Empirical evidence on the predictability of aggregate stock returns has shown that many commonly used predictor variables have little power to predict the market out-of-sample. However, a recent paper by Kelly and Pruitt (2013) find that predictors with strong out-of-sample performance can be constructed, using a partial least squares methodology, from the valuation ratios of portfolios. This paper shows that the statistical significance of this out-of-sample predictability is overstated for two reasons. Firstly, the analysis in KP is conducted on *gross* returns rather than *excess* returns. The predictability literature is primarily concerned with whether there is time variation in the reward for risk. To do this, one has to establish the predictability of *excess* returns rather than *gross* returns which contain both the reward for risk and the risk-free rate. However, KP predict *gross* market returns (yearly and monthly) and therefore include the interest rate component, which may be relatively easy to predict. We show that the inclusion of predictable movements of interest rates overstates the predictability of the equity premium. Secondly, the bootstrap statistics that KP used to assess OOS significance do not account for the correlation structure of innovations. This would be particularly problematic when both the predictor variable is persistent and the innovations in the predictor variable are negatively correlated with innovations in market returns. We show that it is important for OOS tests of significance and that, when simulating samples for the OOS bootstrap statistics, it is important to allow for nonzero correlation between the innovations of the predictor variable and market returns. Accounting for both these effects can radically change the conclusions about whether it is possible to predict market returns OOS. KP report results for extracting predictive information from book-to-market ratios of three sets of portfolios: Fama and French's (1993) 6, 25, and 100 size- and value-sorted portfolios. The recursive OOS R^2 for the sample period 1965-2010 are insignificant for predicting one-year *excess* returns, and for one-month returns, apart from the case of book-to-market ratios of 6 portfolios which are significant at the 10% level. We notice that book-to-market ratios of 100 portfolios always generate significant forecasting, both annually and monthly for the period 1965-2010, on *gross* returns at the 1% level when neglecting the correlation structure of innovations in the bootstrap (5% significance concerning the correlation structure), and further, negative R^2 is found for forecasting one-year and one-month *excess* returns.